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# A cross-cultural comparison of emotional and cognitive reactions toward new food safety risks as a consequence of climate change and globalization

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## ABSTRACT

Climate change and globalization increase the possible occurrence of new food safety risks on fresh produce. Hence, food risk communication needs to be carried out worldwide. This research investigates how consumers in different European countries respond to communication about these new food safety risks. Cross cultural differences between Serbia, Spain, Norway and Belgium, with regard to affective reactions, risk perception, trust, and behavioral intentions are analyzed. Both the emotional and cognitive reactions differ significantly between the countries, as well as the interplay between them, and the behavioral intentions. Hence, the communication strategy needs to be adapted on a national level.


## 1. INTRODUCTION

Fresh produce (fruits and vegetables) is an important part of a healthy, daily diet. However, due to recent disease outbreaks and rapid alerts attributed to fresh produce and derived food products (e.g., salads, fruit juices,…), international concerns emerged with regard to food safety. Micro-organisms (e.g., viruses such as *Norovirus* and bacteria such as *Salmonella* spp., *E. coli* 0157:H7) and contaminants (e.g., mycotoxins, pesticide residues) are identified as concerns in fresh produce (Jacxsens & Uyttendaele, 2010). Currently, scientists are examining the impact of climate change and globalization on the emerging risks for fresh produce (cf. European Project, Veg-i-Trade, 2010-2014). Climate change can lead to the occurrence of new, harmful micro-organisms and contaminants on fresh produce. This is due to the rise of

precipitation and the increasing global temperature. Bacteria that could not survive in cold temperatures (e.g., in Belgium), will be able to do so on fresh produce because of the increasing temperature. In addition, globalization of fresh produce trade leads to an increase in the import and export of these pathogens and contaminants. This increases the risk that exported fresh produce could be contaminated with new pathogens.

Eating contaminated fresh produce can lead to illness (similar to a flue, or gastroenteritis) on a short term, and even to the development of cancer in the long run. Furthermore, "*because of the absence of an adequate heat treatment before consumption of fresh produce the risk cannot be circumvented by the consumer"* (Jacxsens & Uyttendaele, 2010, p. 1). Even though consumers have little control to prevent the emerging food risks from occurring, it is important to make them aware of these risks to avert starting a scare when a food safety outbreak emerges, leading to a decrease of the consumption of fresh vegetables and fruits which will impact the global market. This impact is shown for example after the multistate outbreak of *E. coli* O157:H7 on spinach in 2006 in the United States. The demand for bagged spinach was down by over 25% five months after this outbreak, compared to the same period a year before (Calvin, 2007). Recently (May 2011), due to an outbreak in Germany of the deadly *Enterohaemorrhagic Escherichia coli* (EHEC)-bacteria on cucumbers, the sales number of this vegetable dropped immediately (Frunet, 27th of May 2011). Besides the economical impact of these health crises, it is important to communicate about the recent health risks due to climate change and globalization to inform consumers about recent developments, but also to reassure them and to guarantee they keep on eating fresh produce.

Due to global sourcing, these food safety risks might occur worldwide. Therefore, it is necessary to communicate about them on an international level. However, research has shown that attitudes, perceptions and awareness of societal risks may differ from country to country

depending on the cultural norms (Bickerstaff, 2004; Cope et al., 2010; Hornikx & Hoeken, 2007; Pieniak, 2008; Pornpitakpan, 2004, Slovic, 1999).

Hence, this study investigates the consumer's awareness and perceptions towards the emerging food safety risks in Europe. Data from respondents in four different countries are collected. The countries are selected based on the North-South, East-West dimensions, c.q. Norway (North), Spain (South), Belgium (East), Serbia (West). This way, national differences can become clear with respect to different aspects such as affective reactions, risk perception, trust etc. This could lead to insights on whether risk communication strategies about emerging food safety risks should be implemented globally or adapted on a national level as Cope et al. (2010) suggest.

## 2. THEORETICAL FRAMEWORK

### 2.1. Characteristics of the emerging risks of contaminated fresh produce

The risk of the occurrence of new micro-organisms and contaminants on fresh produce due to climate change and globalization can be described by three characteristics. The first characteristic is that this food risk is relatively new to the public. In addition, there is a genuinely positive perception on food safety. As European research shows: *"No single widespread concern about food-related risks was mentioned spontaneously by the majority of respondents."* (European Commission, Eurobarometer, 2010). This positive perception is rarely questioned because the consequences of eating contaminated food are not immediately visible (cf. cancer on the long run) or are being assessed to another cause[1] (e.g., having a stomach flu) (Fife-Shaw & Rowe, 1996). The unfamiliarity with food risks will have consequences for the development of the risk communication strategy. Prior research

[1] This research has been conducted before the EHEC bacteria outbreak in Germany (May 2011) and France (June, 2011).

(Cauberghe & De Pelsmacker, in press) showed that a higher level of evoked threat of the risk for a novel health issue has no impact on perceived risk. Because a novel health issue leads anyhow to more perceived severity, hence any information about these risks are perceived as relevant.

Secondly, the recommended behavior is to maintain the existing behavior (keep on eating fresh produce) instead of an adaptive preventing behavior, which is the goal in most health risk studies (e.g., smoking cessation, using sun screen, …).

Another characteristic of the current food safety risks, is that consumers cannot prevent the risk from occurring and cannot do anything about it since washing or heating cannot guarantee to prevent the risks. This leads to a high level of uncertainty. Not only the end users will experience uncertainty because they cannot see nor taste if a fresh produce is contaminated, scientists too do not know when, where and on which fresh produce product an outbreak may occur.

Nevertheless, communicating these risks and uncertainty is important because it will increase public trust in the government when a crisis occurs (Lofstedt, 2006). Trust is one of the key principles of effective risk communication (Breakwell, 2000; Lofstedt, 2006; Stevens, 2010). Earlier research on food risk perception for fresh produce as a sequence of climate change and globalization (De Vocht et al., 2011a; De Vocht et al., 2011b) shows that governmental trust could counter low self-efficacy and trust has a mediating role on behavioral intentions, c.q, alerting beloved ones, thinking how to avoid this risk; and intention to seek information. Hence, the role of governmental trust is stressed.

### 2.2. Risk as analysis and risk as feeling

There is a dichotomy between affective and cognitive processing of risk information, and both processes influence the perceptions of the risks and the decision making (Finucane et al., 2000; Fischer & Frewer, 2009; Loewenstein et al., 2001, Slovic et al., 2004; Zajonc, 1980).

Two fundamental ways exist in which consumers process risk communication. The analytical (rational, systematic) and the experiential system (Slovic et al., 2004). These systems are similar to the dual information processing theories which address the two types of information processing, affective and cognitive processing, which influence decision making (Cacioppo et al., 1986; Finucane et al., 2000; Fischer & Frewer, 2009; Loewenstein et al., 2001; Zajonc, 1980).

Slovic et al. (2004, p. 311) posit: "*Risk as feelings refer to our fast, instinctive, and intuitive reactions to danger* (risk information). *Risk as analysis brings logic, reason, and scientific deliberation to bear on hazard management."* The analytical system (risk as analysis) is used when people are motivated to process the presented information more deeply, is relatively slow, effortful and requires conscious control (Cacioppo, Petty, Kao, & Rodriguez, 1986; Chaiken, 1980; Fischer & Frewer, 2009; Slovic et al., 2004). This systematic processing is triggered when consumers are highly involved or in case of a severe risk (Loroz, 2007);

The experiential system (risk as feeling) is fast, intuitive, mostly automatic, using simple cues and heuristics (Cacioppo et al., 1986; Chaiken, 1980; Fischer & Frewer, 2009; Slovic et al., 2004). It usually occurs when the risk has a low personal relevance, and either high or low risky implications (Loroz, 2007). Slovic et al. (2004, p. 311) posit that the experiential system remains the "*most natural and most common way to respond to risks".*

Both systems are continually interactive and dependent of each other, what Finucane et al. (2003) named as *'the dance of affect and reason'* (Slovic et al., 2004). Affect is essential to

rational action (Slovic et al., 2004). This means that risk perception are based on affective and cognitive evaluations, c.q. the risk perception is not only based on what individuals think, but also on what they feel (Finucane et al., 2000; Fischer & Frewer, 2009; McComas, 2006; Slovic et al., 2004). Positive feelings towards a risk related activity (e.g. pesticide use) could lead to a lower risk perception than a negative affect and vice versa (McComas, 2006; Slovic et al., 2004). These insights are used in the affect heuristic (Slovic et al., 2004) and risk as feelings perspective (Loewenstein et al., 2001). Other research found that the overall risk is highly correlated with the experienced dread (Böhm, 2003; Sandman, 1989; Slovic, 1992). Furthermore, the influence of affect (e.g., fear and worry) on intention to seek information (Griffin et al., 1999; Kahlor, 2010; Kuttschreuter, 2006) and on behavior (Loewenstein et al., 2001) is demonstrated.

### 2.3. Risk perceptions across different cultures

Risk perception is a multidimensional construct, which is influenced by complex social, psychological, political and cultural processes (Bickerstaff, 2004; Cope et al., 2004; De Zwart et al., 2009; Kuttschreuter, 2006; Pieniak, 2008; Slovic, 1999). Taking into account the socioeconomic context and past events of a certain culture, could help to predict how consumers will perceive risks (Cope et al., 2010; p. 354). Bickerstaff (2004, p. 836) points out in her research that: *"there is no universal set of predictive rules of risk perception that can be applied to 'the public' en masse".* Cope et al. (2010) even conclude that risk communication should be conducted at a national level, rather than being centralized at a pan-European level, and they address the need for more insights in effective communication strategies in different cultural contexts. The importance of research on cultural differences for communication strategies is stressed by several authors (Bickerstaff, 2004; Cope et al., 2010; De Zwart et al.,

2009; Hoeken & Korzilius, 2003; Hornikx, 2006b, Luszczynska et al., 2005; Weber & Hsee, 2010).

The study of De Zwart et al. (2009) shows that: *"few international comparative studies analyze differences in perceived threat, risk perception, and efficacy beliefs between (infectious) diseases and conditions and differences between countries."* Hence, this study contributes to the existing literature by filling this gap through investigating the differences in food safety risk perceptions between Belgium, Norway, Serbia and Spain. This way, insights can be gained on whether risk communication strategies about emerging food safety risks should be adapted to each country or can be implemented globally.

### 2.4. Cultural Dimensions & risk perception

Taras et al. (2009) analyzed the existing definitions of culture and found the following common elements across the different definitions: it is a complex multi-level construct, which is shared among individuals belonging to a group or a society and it is relatively stable.

A culture is based on shared values by its belonging members. These values have been categorized by Hofstede (1980, 2011a, 2011b) in five value dimensions: power distance, uncertainty avoidance, masculinity-femininity, individualism-collectivism and long-term versus short-term orientation. These cultural dimensions might explain some of the differences in risk perceptions regard food safety across cultures and thus countries. These cultural values can be related to individuals' attitudes towards certain issues and behavior, and the evaluation and decision processes (Feather, 1995, Hoeken & Korzilius, 2003; Hornikx, 2006b).

In table 1 an overview of the scores per dimension of each country is presented (Hofstede et al., 2010). These dimensions are measured on index scales from 0 to 100 (De Mooij & Hofstede, 2002).

| | Power Distance | Uncertainty Avoidance | Individualism | Masculinity | Long Term Orientation |
|---|---|---|---|---|---|
| **Belgium** | 65 | 94 | 75 | 54 | 82 |
| **Spain** | 57 | 86 | 51 | 42 | 48 |
| **Norway** | 31 | 50 | 69 | 8 | 35 |
| **Serbia** | 86 | 92 | 25 | 43 | 52 |

*Table 1: Scores on the cultural dimensions of Hofstede (2010)*

***Power distance***

The power distance index is the extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed unequally in society (Hofstede, 1980, 2011a, 2011b). One could expect for example, that cultures with a large power distance index have more trust in the government and the food safety agencies, since these cultures accept and expect that these organizations have the power to guarantee food safety. Another expectation could be that a large power distance culture has less behavioral intentions to seek information and to alert their beloved ones, since people in these cultures accept and expect that some people determine others behavior (Hornikx & Hoeken, 2007). Belgium and Serbia have a high power distance index, Norway has a low power distance index and Spain is in the middle.

***Uncertainty avoidance***

The uncertainty avoidance index indicates to what extent a culture programs its members to feel either uncomfortable or comfortable in uncertain, unstructured situations (Hofstede, 1980, 2011a, 2011b). Cultures with a high uncertainty avoidance index might be more scared by the emerging food risks, feel more negative emotions, and perceive the risks as more severe. Belgium, Serbia and Spain have a very high uncertainty avoidance index. Hofstede points out:

"*In an effort to minimize or reduce this level of uncertainty, strict rules, laws, policies, and regulations are adopted and implemented. The ultimate goal of this population is to control everything in order to eliminate or avoid the unexpected. As a result of this high uncertainty avoidance characteristic, the society does not readily accept change and is very risk adverse."* (Hofstede, 2011a, 2011b). Norway is situated in the middle of the list.

***Masculinity - femininity***

The masculinity-femininity index refers to the distribution of gender roles (Hofstede, 1980, 2011a, 2011b). The masculinity-femininity index could explain differences in risk perceptions and behavioral intentions between female and male respondents. Hofstede (2001) posits that: *Masculinity stands for a society in which social gender roles are clearly distinct: Men are supposed to be assertive, tough, and focused on material success; women are supposed to be more modest, tender, and concerned with the quality of life. Femininity stands for a society in which social gender roles overlap: Both men and women are supposed to be modest, tender, and concerned with the quality of life*. (Hofstede, 2001, p. 297 in Hoeken & Korzilius, 2007, p. 23). Belgium, Spain and Serbia are situated in the middle of this index. Norway has a low masculinity index.

***Individualism - collectivism***

The individualism-collectivism index is the degree to which individuals are integrated in the society (Hofstede, 1980, 2011a, 2011b). The individualism-collectivism index could influence the perceived risk, trust, and negative affect, since feeling connected to a group makes you feel stronger, and therefore feel less scared. Belgium has a high individualism score, followed by Norway. Spain is situated in the middle and Serbia has a low individualism score.

### *Long term vs. short term*

The long term versus short term index, gives an indication about the society's pragmatic, future oriented perspective view or the conventional historic, short-term perspective (De Mooij et al., 2002; Hofstede, 2011a, 2011b). Societies that are long-term oriented have values as thrift, pursuit of peace of mind, acceptance of change,… and are mostly found in East Asia (De Mooij et al., 2002; Hofstede, 2011b). Short-term oriented societies foster virtues related to the past and present, as national pride, respect for tradition, fulfilling social obligations,… and are found in the Western world (De Mooij et al., 2002; Hofstede, 2011b).

A low long term index might indicate that people are less scared, and perceive a lower risk since the most severe consequences as cancer are developed in the long run. Belgium has a high long term orientation, Spain and Serbia are situated in the middle and Norway is more short term oriented.

## 3. RESEARCH QUESTIONS

As shown above, risk perceptions are an interaction of both cognitive and affective appraisals. Hence, the following research questions are posed with respect to the emerging food safety risks:

RQ1: Does the general awareness of the food safety risks differ cross-cultural?

RQ 2: Do the emotional reactions to the risk message differ cross-cultural?

RQ 3: Do the cognitive reactions to the risk message differ cross-cultural?

RQ 4: Do the behavioral intentions, after reading the risk message, differ cross-cultural?

RQ 5: Are the emotional and cognitive reactions to the risk message correlated, and do they differ cross-cultural?

RQ 6: Are emotional and cognitive reactions to the risk message predictors of possible behavioral intentions, and does it differ cross-cultural?

## 4. METHOD

### 4.1. Procedure

To investigate the research questions posed in this study, a quantitative survey was developed to measure risk awareness, cognitive perception and emotional reactions toward the emerging food safety issues. Four European countries were selected to compare the results, namely Belgium, Spain, Serbia and Norway. These countries represent the north-south and east-west axis within Europe.

### 4.2. Participants

A total of 864 respondents filled out the survey with a mean age of 35.71 (*SD*= 12.91; age range= 63 years, from 15 years till 78), 45.1% is male. In Belgium, the data was collected in November 2010. In the other 3 countries the data was collected using an online survey in April-May 2011. All data were collected before the outbreak of the EHEC bacteria. The online survey was disseminated by local universities mailings, on LinkedIn, online local forums and local inhabitants (snowball effect).

In Belgium a total of 475 respondents participated. To keep the amount of respondents equal, 230 respondents have been randomly picked out of the dataset (male= 46.5 %, *Mage*= 36.21 years, *SD*= 17.99, age range= 66, from 15 till 77 years). In Norway, 229 respondents filled out the survey (male= 40 %, *Mage*= 38.48, *SD*=12.36; age range= 58, from 20 till 78 years). In Spain, 189 respondents participated in this survey (male= 48.4 %, *Mage*= 35.39, *SD*= 8.63, age range= 49, from 19 till 68 years). In Serbia, responses of 212 respondents are collected (male= 45%, *Mage*= 32.81, *SD*=9.07; age range= 46, from 17 till 63 years). There is a significant difference between the different countries for age ($F(3,861)$, 7.24, $p<.001$). The post hoc test Scheffe reveals that the age difference is only significant for Serbia ($M$=32.81) and Norway ($M$= 38.48). No significant differences have been found between the division of women and men ($\chi^2$ (3, N= 864) = 3.88, p=.275).

Most of the respondents (65.3%) have a bachelor and master degree. More than half of the Belgian respondents have the highest percentage of degrees below or equal to higher secondary school (56.4%). The Norwegians have the highest percentage of master and post university degrees (52.4%). The highest percentage of bachelor degrees (43.8%) can be found in Serbia, as well as the post university degrees (18.1%). The percentage of master degrees is similar in Norway (41.3%) and Spain (41.5). There is a significant difference for educational levels between the different countries ($\chi^2$ (12, N= 864) = 237.65, p<.001).

### 4.3.Measurements

The questionnaire was developed using existing 7 point Likert and semantic scales. First, a short risk message was given explaining the emerging food risks as a consequence of globalization and climate change. Immediately after reading this message, 10 emotions were measured: anger (*M*= 2.75, *SD*=1.70), sadness (*M*= 2.93, *SD*= 1.78), fear/anxious (*M*= 2.69, *SD*= 1.57), frustration (*M*= 2.85, *SD*= 1.73) , resigned (*M*= 3.13, *SD*= 1.72), helpless (*M*= 3.15, *SD*= 1.87), worried (*M*= 3.74, *SD*= 1.79), relieved (*M*= 2.59, *SD*= 1.67), guilty (*M*= 2.32, *SD*= 1.54), distrust (*M*= 1.68, *SD*= 1.67). These negative emotions are conceptualized in a new concept: 'Negative affect'. One question was inserted to know whether the respondents had heard about the risk before. Subsequently, perceived risk was measured using two concepts: perceived severity (Witte, 1992) (e.g., *'I see the new germs as a threat for the food safety of fresh produce'*) and perceived susceptibility (Witte, 1992) (e.g., *'It is likely that I get in touch with fresh produce which contain germs'*). This is a scale which measures the mere cognitive reactions to the risk message. Intention to seek information (Kahlor, 2010) (e.g., *'I have the intention to seek information about the risks of new germs on the food safety of fresh produce, due to climate change'*) (Kahlor, 2010), general behavioral intentions (e.g., *'I will alert my beloved ones', 'I will rinse my fresh produce better after reading this*

*message', 'I will think how to avert this risk'*) (based on De Wit et al., 2008), trust (De Jonge et al., 2007) (e.g., '*I trust the government and food safety agencies that they will guarantee food safety of fresh produce'*), and subjective knowledge (e.g.: *'I know a lot about the risks of new germs on the food safety of fresh produce, due to climate change'*) (based on Kahlor, 2010) as well. At the end of the questionnaire some socio demographic variables were measured. The questionnaire was originally developed in Dutch, was subsequently translated in English, in order to translate in Serbian, Norwegians and Spanish by native speakers.

An overview of the measured concepts and mean values, standard deviations and Chronbach's Alpha is given in table 2. The internal consistency per construct per country was measured, as suggested by Erkut et al. (1999).

| | **Norway** | **Spain** | **Serbia** | **Belgium** | **Total** |
|---|---|---|---|---|---|
| **Perceived severity** | | | | | |
| Chronbach's Alpha | .840 | .853 | .849 | .795 | .851 |
| Mean | 4.57 | 4.26 | 5.31 | 4.12 | 4.56 |
| SD | 1.26 | 1.39 | 1.27 | 1.30 | 1.38 |
| **Perceived Susceptibility** | | | | | |
| Chronbach's Alpha | .823 | .906 | .662 | .855 | .839 |
| Mean | 5.64 | 5.16 | 5.45 | 4.47 | 5.17 |
| SD | 1.16 | 1.32 | 1.08 | 1.43 | 1.33 |
| **Perceived Risk** | | | | | |
| Chronbach's Alpha | .548 | .629 | .794 | .736 | .704 |
| Mean | 5.11 | 4.71 | 5.38 | 4.30 | 4.87 |
| SD | 1.00 | 1.16 | 1.07 | 1.23 | 1.19 |
| **Trust** | | | | | |
| Chronbach's Alpha | 0.817 | 0.774 | 0.775 | 0.732 | 0.778 |
| Mean | 3.80 | 3.78 | 3.09 | 3.71 | 3.60 |
| SD | 1.29 | 1.38 | 1.36 | 1.11 | 1.32 |
| **Intention to seek information** | | | | | |
| Chronbach's Alpha | 0.858 | 0.946 | 0.903 | 0.918 | 0.905 |
| Mean | 3.53 | 4.06 | 4.31 | 3.47 | 3.82 |
| SD | 1.41 | 1.57 | 1.64 | 1.62 | 1.60 |
| **Behavioral intentions (to think & to alert & to rinse)** | | | | | |
| Chronbach's Alpha | 0.770 | 0.766 | 0.806 | 0.796 | 0.797 |
| Mean | 4.38 | 4.74 | 5.15 | 4.01 | 4.55 |
| SD | 1.42 | 1.41 | 1.47 | 1.50 | 1.51 |
| **Subjective Knowledge** | | | | | |
| Chronbach's Alpha | 0,828 | 0,860 | 0,773 | 0,803 | 0,817 |

| | | | | | |
|---|---|---|---|---|---|
| Mean | 4,63 | 5,02 | 5,18 | 5,02 | 4,96 |
| SD | 1,59 | 1,55 | 1,44 | 1,55 | 1,55 |
| **Negative affect (6 items)** | | | | | |
| Chronbach's Alpha | .894 | .857 | .824 | .850 | .869 |
| Mean | 3.12 | 3.58 | 3.66 | 2.67 | 3.22 |
| SD | 1.36 | 1.28 | 1.30 | 1.19 | 1.34 |
| **Resigned** | | | | | |
| Mean | 2.91 | 4.06 | 3.57 | 2.76 | 3.27 |
| SD | 1.61 | 1.67 | 1.71 | 1.62 | 1.73 |

*Table 2: Overview of the measured concepts and mean values, standard deviations and Chronbach's Alpha*

## 5. RESULTS

Since the sample significantly differs for some sociodemographic measures, c.q. age and education level, the results are controlled for these variables. A Mancova analyzing the impact of nationality sequentially with the impact of two covariates, age and education level, on the different depending variables shows that there is no effect of education level on any dependent variable ($p$>.006) (using a Bonferroni adjusted alpha level of .006). The covariate age does have an effect (using a Bonferroni adjusted alpha level of .006), on behavioral intentions ($p$=.003) and intention to seek information ($p$<.001). The older the respondent is, the more likely he will change his behavior or seek for information. However, the effects of nationality on all 8 dependent variables, remain significant ($p$<.001), after inserting the covariates age and educational level. Hence, the significant effects of nationality are valid.

### 5.1.Cross cultural comparison of general awareness

There are significant differences between the different countries in the amount of respondents that had heard about the risk or not ($\chi^2$ (3, N= 864) = 30.54, $p$<.001). From the Serbian respondents, 72.9% state that they already heard about this risk. In Norway, this percentage is

63.8, in Spain it is 57.2% and the lowest percentage can be found in Belgium, only 47.3% state that they had heard about it. An overview is given in figure 1.

The subjective knowledge differed as well between the different countries, as shown in a one-way Anova ($F$(3,861), 5.15, p=.002). The post hoc test Scheffe reveals that only Serbia ($M$= 5.18) perceives a significantly higher knowledge than Norway ($M$= 4.63), Belgium ($M$= 5.02) and Spain ($M$= 5.02) are situated in the middle of these two.

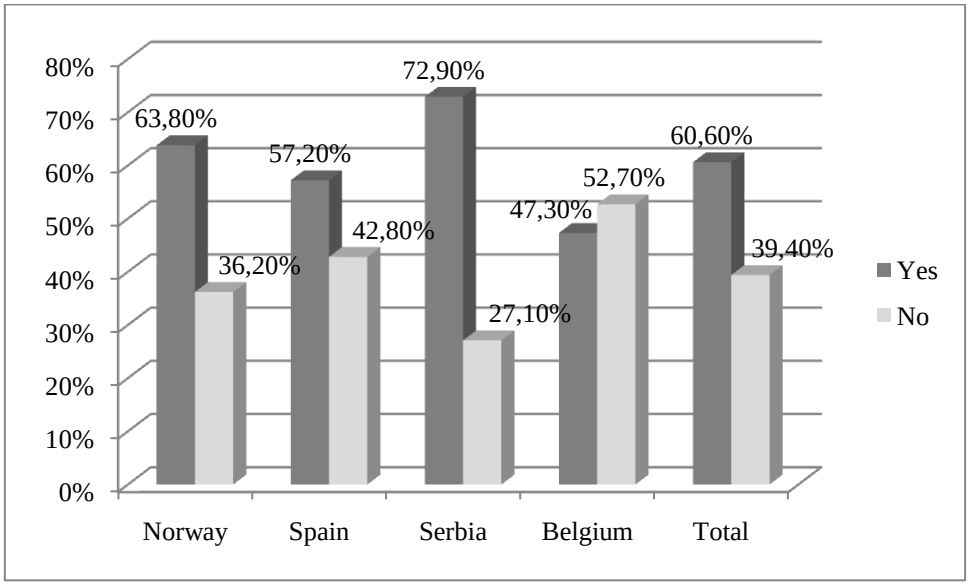


*Figure 1: Percentages of respondents who had (not) heard about the risk*

### 5.2. Cross-cultural comparison of emotional reactions toward the risk

Using a one-way Anova, a significant difference appeared for negative affect per country ($F$(3,861), 25.95, $p$<.001). The post-hoc test Scheffe reveals that the negative affect toward the risk for the Belgians ($M$= 2.67) is the lowest and differ significantly from the Serbians ($M$= 3.66), Spanish ($M$= 3.58) and Norwegians ($M$= 3.12). The negative affect toward the issue of the Norwegians ($M$= 3.12) also differs significantly from the three other countries. In figure 2 an overview is given.

Only in Belgium a significant difference between female and male respondents for negative affect is found ($t$=-2.45, df=217, $p$=.026). Women have a more negative affect toward the risk ($M$=2.84, $SD$= 1.17) than men ($M$=2.45, $SD$= 1.19).

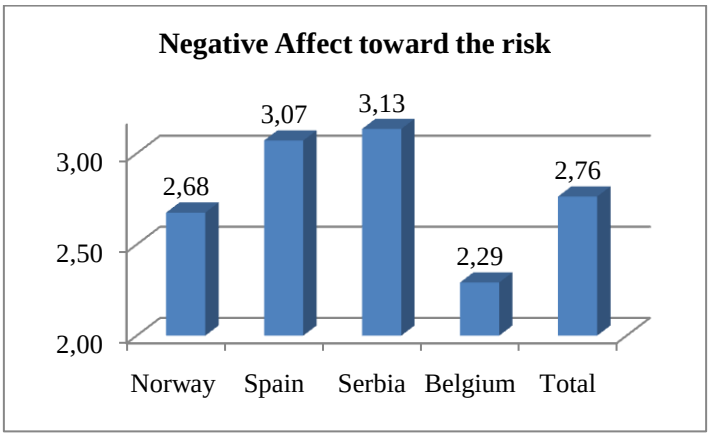


*Figure 2: Mean value per country for negative affect toward the risk*

Furthermore, a significant difference appeared for the feeling 'resigned' ($F$(3,861), 26.24, p<.001). In figure 3 an overview is given. The Spanish feel the most resigned ($M$= 4.06), followed by the Serbians ($M$= 3.57), the Norwegians ($M$=2.91) and the Belgians ($M$= 2.76).

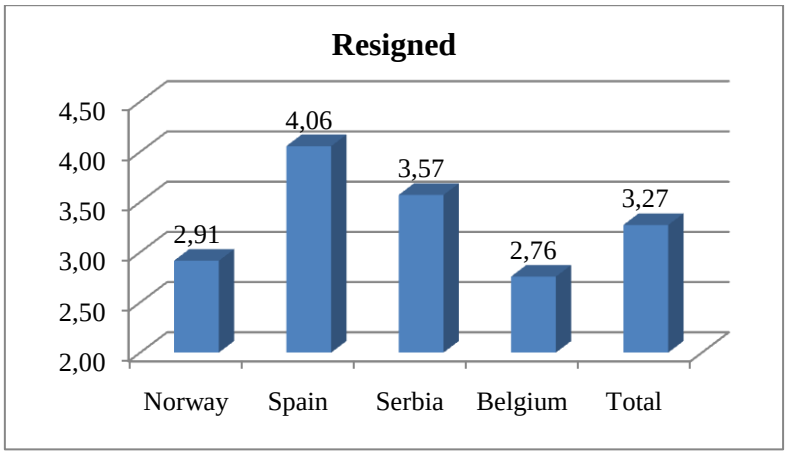


*Figure 3: Mean value per country for the emotion resigned*

### 5.3. Cross-cultural comparison of cognitive reactions toward the risk

#### 5.3.1. Perceived risk

Significant differences emerged between the different countries for perceived severity ($F$(3,861), 35.25, $p$<.001) and perceived susceptibility (F (3,861), 37.34, $p$<.001), and subsequently for risk perception ($F$(3,861), 38.53, $p$<.001),

Serbian consumers perceive the risk as highest ($M$= 5.38) and perceive the risk as the most severe ($M$=5.31). The Belgians perceive the risk to be the least severe ($M$= 4.12), perceive themselves as the least susceptible ($M$= 4.47) and perceive the lowest risk ($M$= 4.30). These values differ significantly from all other countries. Spanish people have the second lowest perceived risk ($M$= 4.71), which is significantly different from the three other countries. The Norwegians estimate their chances to come into contact with the risks (perceived susceptibility), the highest ($M$= 5.64). An overview is given in figure 4.

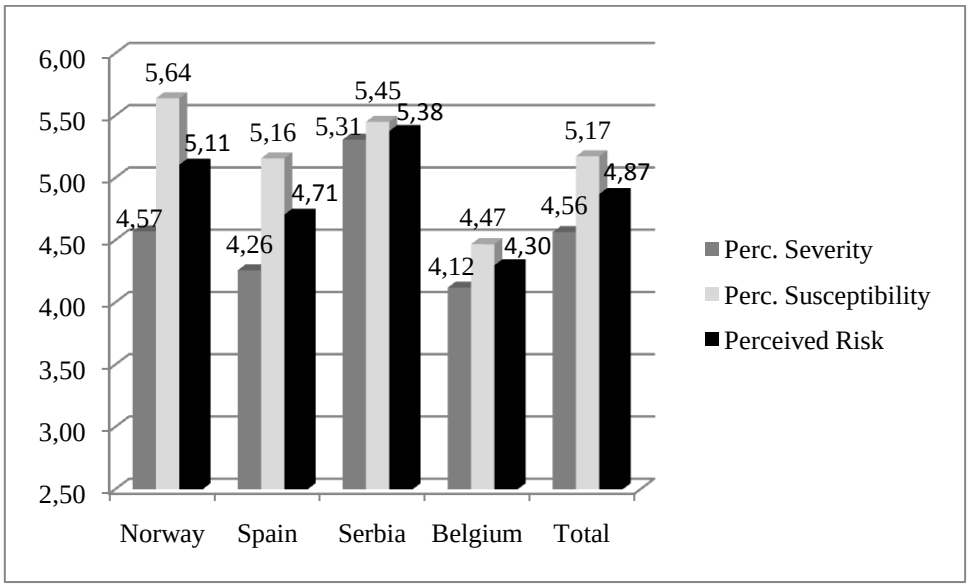


*Figure 4: The mean values for perceived risk, perceived susceptibility & perceived severity*

Only in Norway and Belgium significant differences based on gender are found for perceived risk, by conducting different independent t-tests ($p$<.001). The Norwegians ($M$= 5.32) and

Belgian (*M*= 4.51) female respondents perceive the risk higher than the male respondents (*M* $_{Norway}$= 4.77; *M* $_{Belgium}$= 4.03).

### 5.3.2. Trust

The importance of governmental trust is stressed. Trust differs significantly in each country (*F*(3,861), 14.69, *p*<.001). The mean values are below 4, c.q. the middle of the 7-point scale. Serbians have the lowest mean value for trust (*M*= 3.09) and differ significantly from the three other countries. The values for trust in Norway (*M*= 3.80), Belgium (*M*= 3.71) and Spain (*M*= 3.78) are similar and do not differ significantly. In figure 5 an overview is given for the mean values of trust.

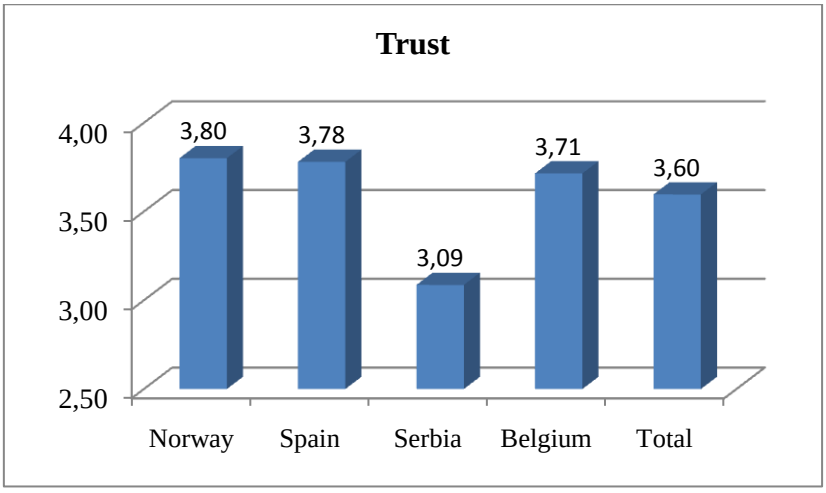


*Figure 5: The mean values for trust*

### 5.4. Cross-cultural comparison of behavioral intentions regarding the risk

A one-way Anova shows a significant difference between the countries for behavioral intentions (*F*(3,861), 23.89, *p*<.001). A significant difference was also found for intention to seek information (*F*(3,861), 14.77, *p*<.001). (cf. Figure 6)

The highest behavioral intentions ($M$= 5.15) and intentions to seek information ($M$= 4.31) are found in Serbia ($M$= 5.15). These values differ significantly from Belgium which has the lowest scores ($M_{BI}$= 4.01, $M_{seekinfo}$= 3.47), and from Norway as well ($M_{BI}$= 4.38, $M_{seekinfo}$= 3.53).

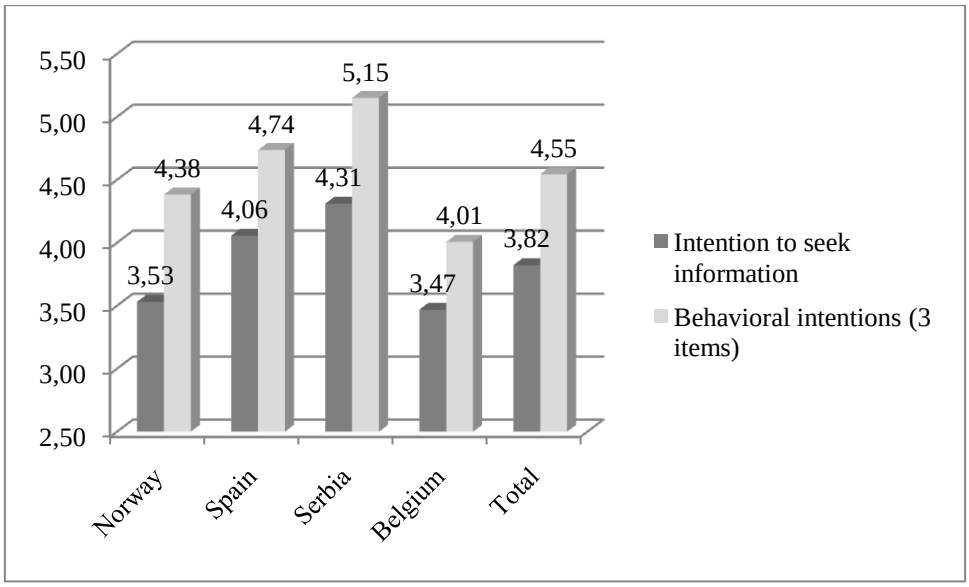


*Figure 6: The mean values for behavioral intentions and intention to seek information*

Behavioral intention (3 items) is the only concept that significantly differs for men and women in all countries after applying different independent t-tests ($p$<.001). The behavioral intention is higher for women than for men, as can be seen in figure 7.

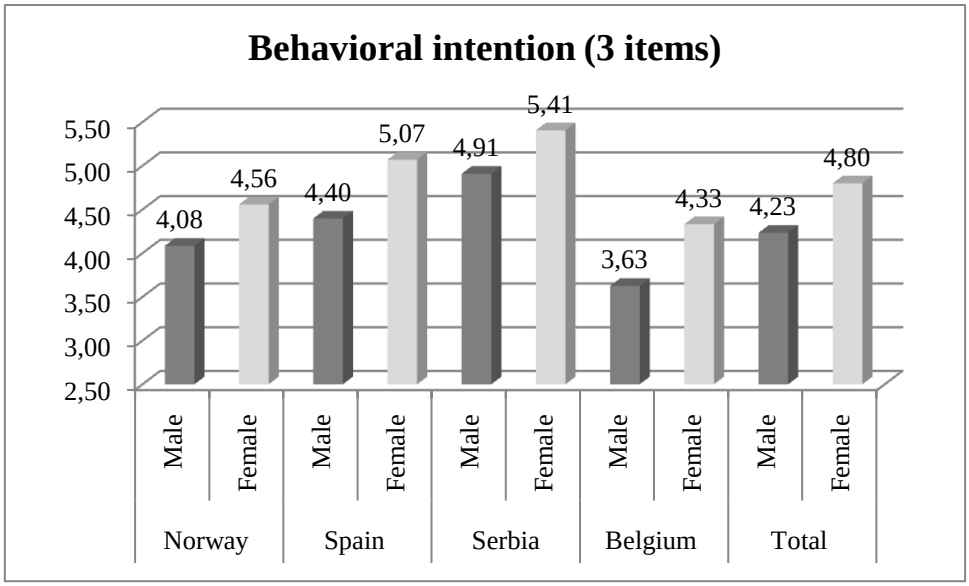


*Figure 7: significant differences between men and women for behavioral intentions.*

### 5.5. Correlations between affective and cognitive reactions toward the risk

As posited in the research questions, the correlation between affect and perceived risk will be investigated.

As can be seen in table 3, negative affect and perceived risk correlate, and the strongest correlation can be found in Belgium (r=.344), the weakest in Serbia (r= .164).

| | **Norway** | **Spain** | **Serbia** | **Belgium** | **Total** |
|---|---|---|---|---|---|
| **Negative Affect * Perceived risk** | .266** | .265** | .164* | .344** | .306** |

**= Correlation is significant at the 0.01 level (2-tailed)
*= Correlation is significant at the 0.05 level (2-tailed)

*Table 3: correlation between affect & perceived risk*

### 5.6. The impact of affective and cognitive reactions on behavioral intentions

A linear regression is carried out with the variables perceived risk and negative affect on behavioral intentions and intention to seek information. Using the enter method, significant models emerged (Norway: $p<.001$, Spain: $p=.003$, Serbia: $p=.015$, Belgium: $p=.021$, Total: $p<.001$). An overview of the model can be found in table 4. The model on the intention to seek information explains 27.6% of the total variance in Norway (Adjusted $R^2= .276$), which is the highest explained total variance for the intention to seek information. The model on the behavioral intentions explains 36.5% of the total variance in Serbia (Adjusted $R^2= .365$), which is the highest explained total variance for the behavioral intentions.

| | **Intention to seek information** | | | **Behavioral intentions (3 items)** | | |
|---|---|---|---|---|---|---|
| | **B** | **SE B** | **beta** | **B** | **SE B** | **beta** |
| **Norway** | | | | | | |
| Perceived risk | .477 | .086 | .336** | .458 | .084 | .324** |
| Negative Affect | .343 | .062 | .333** | .383 | .060 | .376** |
| $R^2$ | 0.276 | | | 0.304 | | |
| **Spain** | | | | | | |
| Perceived risk | .397 | ,102 | .287** | .485 | .084 | .403** |
| Negative Affect | .228 | ,091 | .185* | .223 | .076 | .206* |
| $R^2$ | 0.135 | | | 0.236 | | |
| **Serbia** | | | | | | |
| Perceived risk | .766 | .103 | .484** | .839 | .085 | .593** |
| Negative Affect | .099 | .083 | .078 | .088 | .069 | .076 |
| $R^2$ | 0.245 | | | 0.365 | | |
| **Belgium** | | | | | | |
| Perceived risk | .248 | .094 | .186** | .407 | .081 | .330** |
| Negative Affect | .217 | .097 | .158* | .296 | .083 | .235** |
| $R^2$ | 0.08 | | | 0.211 | | |
| **Total** | | | | | | |
| Perceived risk | .419 | .047 | .305** | .534 | .040 | .417** |
| Negative Affect | .251 | .041 | .210** | .281 | .035 | .251** |
| $R^2$ | 0,175 | | | 0.297 | | |

**=p<.001
*=p<.005

*Table 4: overview of logistic regression, using the enter model, on behavioral intentions*

Looking at the model of all respondents, it becomes clear that the contribution of perceived risk in the two models is higher than negative affect. Although, in Norway and Belgium, the standardized Beta coefficients are similar for both perceived risk as affect.

The regression on behavioral intentions and intention to seek information shows that not every concept contributes in the same way to the predicting value for each country.

## 6. DISCUSSION & CONCLUSION

Due to climate change and globalization new food safety risks emerge, which can affect the whole world. This means that food risk communication needs to be carried out worldwide. From this, the question arises whether food risk communication should be locally adapted or can be implemented on an international level. In this study the cross cultural differences between Serbia, Spain, Norway and Belgium, with regard to the general awareness, affective reactions, risk perception, trust, and behavioral intentions are investigated.

The general awareness differs significantly between the different countries. More than half of the respondents had heard about the risk, with the highest percentages in Serbia and Norway. But, these two countries differ significantly with regard to their subjective knowledge. The Serbians perceive a significantly higher knowledge than the Norwegians.

The affective reactions, c.q. 'negative affect' and 'resigned', differ significantly per country. Trust, perceived risk and behavioral intentions differ as well.

The Serbians indicate the highest mean value for negative affect, the highest perceived risk and the lowest trust in the government that food safety will be guaranteed. The perceived threat of the risk and the emotional reaction can be allocated to the lack of trust in their government and the non existence of a food safety organization. This high perceived risk, negative affect and low trust still leads to the highest behavioral intentions and intentions to seek information.

The Belgians have the lowest mean value for negative affect and for perceived risk. But Belgians also have the lowest value for 'resigned' and have a low general awareness of the issue. This means that they do care about these risks, and accept the risk message. This might be because of governmental trust. Although the mean value of the concept trust is not very high (in none of the countries), the emotional reaction, distrust is the lowest in Belgium and

differs significantly from all other countries, which could be an indication of trust. Hence, the behavioral intentions in Belgium are the lowest; but they have enough faith in their government, which makes the Belgians being more laid-back, as shown in earlier research (De Vocht et al., 2011b).

The emotional state 'resigned' is the highest in Spain, and negative affect is the second highest. This is interesting to see, knowing that Spain has also the second lowest perceived risk. The trust in the government is in comparison with the other countries (besides Serbia) similar, but in Spain the highest value for distrust can be found. Hence, in Spain, it seems that there is a general feeling of resignation, which would lead to message rejection, c.q. behavioral intentions. However, the behavioral intentions in Spain are the second highest.

In Norway, the mean values for perceived risk, severity and susceptibility are moderate. This is remarkable, because past research (de Zwart et al., 2009; Eurobarometer, 2010; Mullet et al., 2005; Pieniak et al., 2008) showed that Scandinavian countries perceive risks lower than other countries. This has been allocated to the media coverage in Scandinavia, that report more about risks abroad and less about risks in Scandinavia (Mullet et al., 2005). The high risk perceptions could be partly attributed to the outbreak of *Yersinia enterocolitica* O:9 infection in March 2011, with bagged salad mix indicated as a possible source. The producer has voluntarily withdrawn these salad bags from the market (MacDonald et al., 2011).

An explanation for the different values for risk perception can be found in research of Hoeken and Korzilius (2003). This research indicates that each country has its own way to design risk information. Hence, it could be that the risk message used in this research, written by Belgians, is not perceived in the same way by the other countries, which could explain the different perceived risk appraisals.

Another explanation can be found in the affect heuristic and risk as feelings perspective (Loewenstein et al. 2001; McComas, 2006; Slovic et al., 2004), in which negative feelings could lead to higher risk perception (although this is not the case in Spain and Norway) and vice versa. It does apply for Belgium, where the lowest perceived risk and the lowest negative affect are reported. A positive, though not very strong, correlation between negative affect and perceived risk has been found in each country, which supports the affect heuristic. The strength of the correlation differs per country, the strongest is found in Belgium, the weakest in Serbia.

The predictive value of negative affect and risk perception are analyzed as well, following earlier research that showed that affect and risk perception could influence behavioral intentions (Griffin et al., 1999; Kahlor, 2010; Kuttschreuter, 2006; Loewenstein et al., 2001). For predicting the intention to seek information, 27.6% of the total variance in Norway has been explained, which is the highest. For behavioral intentions, the highest explained variance is found in Serbia, with 36.5%.

Looking at the model containing all respondents, it becomes clear that the contribution of perceived risk in the two models is higher than negative affect. Although, in Norway and Belgium, the standardized beta coefficients are similar for both perceived risk as affect, which means that both contribute to the model to the same extend.

This research also wanted to investigate whether the cultural dimensions of Hofstede (1980) can help to explain the found differences. Cultures with a high uncertainty avoidance index might experience more negative affect by the emerging food risks and perceive the risk higher because of the uncertainty. Serbia and Spain have a high uncertainty avoidance index, and have the two highest mean values for negative affect; the perceived risk is also the highest in Serbia. Norway has a low uncertainty avoidance index, and has a lower mean value for

negative affect. Hence, it could be assumed that the uncertainty avoidance index is a factor that could help explain cultural differences. However, Belgium has the lowest negative affect, and the lowest perceived risk, and has the highest uncertainty index. A possible explanation for this inconsistency could be the high value of trust in Belgium, which could have countered the perceived risk. This means that the uncertainty avoidance index can be used as an explanatory concept, but that it needs to be interpreted with caution , knowing that other factors could influence perceptions too.

The masculinity-femininity index could explain differences in risk perceptions and behavioral intentions between female and male respondents. The 'general behavioral intentions' is the only concept that significantly differs for men and women in all countries. The behavioral intention is higher for women than men. Since Norway is a very high femininity society, no differences should be visible because both men and women are supposed to be concerned with the quality of life (Hofstede, 2001). The three other countries are situated in the middle, which could explain these gender differences.

Cultures with a large power distance index could have more trust in the government and the food safety agencies, and could have less behavioral intentions. Belgium has a high level of trust, and the lowest behavioral intentions, and its power distance index is high. Serbia on the contrary, has a low level of trust, high level of distrust and high behavioral intentions, though it also has a high power distance level. This could be allocated to the fact that Serbia has no food safety agency, and that Serbians have less faith in their government as an institution, but they might trust other institutions and organizations more (e.g. university, police,...) Hence, the power distance index cannot be the only factor used to explain differences in trust and behavioral intentions.

The individualism-collectivism index could influence the perceived risk, trust, and negative affect, since feeling connected to a group makes somebody feel stronger. Belgium has a high

individualism score, high trust, low perceived risk and low negative affect, which does not match the proposed influence. Serbia has the reversed values for these concepts, but a low individualism index. The differences cannot be explained using this cultural dimension.

A low long term index might indicate that people perceive a lower risk since the most severe consequences as cancer are developed in the long run. Belgium has a high long term orientation, and the lowest perceived risk, Spain and Serbia are situated in the middle and have the second lowest and highest perceived risk; Norway is more short term oriented and has the second highest perceived risk. No explanations can be found using the long term orientation index.

The use of the cultural dimensions by Hofstede as explanatory factors for cross cultural differences with regard to negative affect, risk perceptions, trust and behavioral intentions need to be interpreted with care, knowing that other factors might also influence the risk perceptions.

Hence, communication needs to be adapted on a national level, since there are too many differences in perceived risk, affective reaction, trust and behavioral intentions.

## 7. LIMITATION AND FURTHER RESEARCH

In cross-cultural research, some limitations might occur. The first limitation starts with the translation of the risk message and the questionnaire, e.g., different concepts could be misinterpreted or badly translated (Hoeken & Korzilius, 2003). Since not all Chronbach's alphas resemble, it is not entirely sure that the same concepts have been measured, so the data needs to be interpreted with care. Another limitation that could be present is the extremity of responses (Hoeken & Korzilius, 2003). In some countries the grades in the educational system range from 1 till 10 (10 being very good), in other countries the grades range from 1 till 6 (6

being very bad). The questionnaire attempted to counter this problem by using labels ('totally disagree' until 'totally agree') with numbers from -3 till +3.

A final limitation is the fact that the sample is not representative for each country, so results need to be interpreted with care, and cannot be generalized for every population in each country. For example, the Unesco statistics show that only 50% of the Serbians are in tertiary education, while 89% of the Serbian respondents are in tertiary education. Unesco statistics also state that 66% of the Belgians are in tertiary education (Unesco Institute for Statistics, 2011), but in our data only 43.1% has this education level.

Since the online survey was distributed before the EHEC-bacteria outbreak, it would be interesting to find out what the impact of this outbreak is on the perceived risk, emotional reactions and behavioral intentions in further research.

Finally, cross cultural differences with regard to trust, affective reactions, perceived risk and behavioral intentions have been found after reading the same risk message. Further experimental research is necessary to be able to point out the exact preferences for a risk message, per country.

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